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SOLUTIONS FOR RCAF AIR REFUELLING RECAPITALIZATION

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AIM

1. The aim of this service paper is to address the Royal Canadian Air Force's (RCAF) recapitalization of its strategic air-to-air tanker transport capability. The age of the RCAF's current aerial refuelling capability is driving the necessity to find a replacement for its current tanker, the CC150 multi-role tanker transport (MRTT). The goal is to replace the CC150 before the end of its projected service life in 2026.¹ From the perspective of a foreign airlift pilot, this paper will highlight the operational considerations the RCAF should take into account, three possible solutions for replacement, and each solution's financial impact. This paper will provide the author's recommended solution most beneficial to the RCAF from a fiscal and broad operational point of view, and will not address in detail the nuances of implementing the solution.

INTRODUCTION

2. United States Air Force (USAF) tanker pilots proudly wear a small rectangular patch on their flight suit with the acronym "NKAWTG." The rhyming playfulness and sentiment of this patch indicates that other airborne platforms would not be able to perform their job "... without tanker gas" (WTG). Canadian Doctrine captures a similar sentiment, without the crassness, by identifying air-to-air refuelling as a critical force enabler and a force multiplier that allows the Canadian Armed Forces (CAF) to project its forces across vast distances in a relatively short amount of time.² With only two tanker aircraft, the RCAF has its hands tied when called upon to simultaneously support the North American Aerospace Defense Command (NORAD) mission, and engaging abroad in an operation that requires aerial refuelling (AR). These two missions categorized by the CAF as force employment, do not take into account the necessary training sorties required for force generation.³

3. Although Canada is increasing its defense spending over the next decade, it will still need to keep a close eye on the economic decisions made in replacing its aging tanker fleet.⁴ First, as a way to better determine the pros and cons of each proposed solution to the RCAF's tanker replacement, the primary operational needs will be identified. Then, based on these operational needs, the proposed solutions of designing a new tanker custom to the RCAF, selecting a new "off-the-shelf" tanker, or purchasing another nation's used tanker fleet will be explored. The paper will conclude with a

¹ Chris Thatcher, "Airbus, Boeing Tankers Jockey to Replace Polaris," *Skies Magazine*, last modified June 2017, <https://www.skiesmag.com/news/airbus-boeing-tankers-jockey-replace-polaris/>.

² Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine*, (Ottawa: DND Canada, 2016), 35.

³ *Ibid.*, 28.

⁴ Ken Hansen, "What's Happening to Canada's Defence Spending?", *Maclean's* last modified 14 March 2018, <https://www.macleans.ca/opinion/whats-happening-to-canadas-defence-spending/>.

recommended solution that provides the RCAF the ability to fulfill their mission with the most effective use of the Canadian defense budget.

DISCUSSION

4. The operational needs the RCAF will require from a replacement tanker will stem from the National Defense Policy of *Strong, Secure, Engaged* (SSE).⁵ Without diving deeply into the specific refuelling needs that each segment of the SSE policy would drive, this paper will make three generic assumptions. The first assumption is that to reduce the cost of infrastructure, a new tanker will be based in Trenton, Ontario where the CC150 is currently maintained. In order to provide AR capability across the vastness of Canada from Trenton and operate overseas with a rapid response, the second assumption requires the tanker propulsion be provided by an efficient jet engine as opposed to a propeller like the CC130. The third assumption will be that the tanker should have the capability to serve in the airlift role and consideration must be given to the aircraft's cargo capacity. The final assumption, though briefly addressed in the third solution, will be that the USAF will continue to support its own boom refueled aircraft, and the Canadian tanker will only provide fuel to probe-and-drogue aircraft.

Acquisition of a New Design

5. The first proposed solution suggests the RCAF take an approach similar to the USAF that led to the design of the Boeing KC-46. The USAF was seeking to replace its aging fleet of KC-135s which were first employed in 1965, and the KC-10s which were employed in 1981. Beginning in 2007, the USAF submitted its request for the KC-X program with the intent to purchase 179 aircraft.⁶ Boeing was awarded the contract for the KC-46 in 2011.⁷ Plagued by manufacturing delays and a controversial battle with Airbus during the acquisition process, the first KC-46 became operational in May of 2019, two years after its target date of 2017.⁸

6. The benefit of having a tanker designed for the RCAF is that it will be fully customized to the operational needs of the RCAF. Based on the RCAF's prioritization of domestic strength then North American security, the tanker would be tailored to provide pallet positions exceeding the 18-pallet capacity of the C-17 and potentially allow a unique capability to haul small rolling stock that would normally require palletization. The KC-46 is only capable of carrying palletized cargo and passengers.⁹ The most

⁵ Department of National Defence, *Strong, Secure, Engaged - Canada's Defence Policy*, (Ottawa: DND Canada, 2017), 59.

⁶ Department of Defense, D-2007-103, *Air Force KC-X Aerial Refuelling Tanker Aircraft Program*, (Arlington: DoD IG, 2007), i.

⁷ Valerie Insinna, "Boeing Delivers First KC-46, but Fixes to Technical Problems Still Years Away," *Defense News*, last modified 10 January 2019, <https://www.defensenews.com/breaking-news/2019/01/10/boeing-delivers-first-kc-46-but-fixes-to-technical-problems-still-years-away/>.

⁸ Ibid.

⁹ "Boeing KC-46 Tanker," *AeroWeb*, last accessed 18 October 2019, <http://www.fi-aeroweb.com/Defense/KC-46-Tanker.html>

significant benefit for the RCAF is that the technology in the aircraft will be the least obsolete among all existing tanker aircraft and should guarantee the longest service life of all the proposed solutions. Though the CC150 MRTT is newer in design than the USAF's KC-135 and KC-10 fleet, having not received a glass cockpit upgrade, its flight instruments are still quite antiquated in comparison to modern aircraft.

7. Unfortunately, this customization comes with a hefty price tag. In January of 2019, “. . . the [USAF] estimates that its total cost, including development, procurement and military construction, will be 43 billion United States Dollars (USD).”¹⁰ This cost exceeds the entire 18.1 billion Canadian Dollar annual defense budget of the Canadian government in 2018-2019.¹¹ Additional to the time it would take for development and procurement would be the time and resources to develop the training program, new flight procedures and publications, as well as training the receiver aircraft pilots on another tanker. There is also the possible downside to a completely new tanker with maintenance and part replacement. If no other nation is willing to purchase the tanker, the production line of replacement parts may cease to exist once the manufacturer no longer has a reason to maintain the production facility.

A New Existing Airframe

8. The second possible solution for replacing the aging CC150 MRTT would consume less time and resources in the initial acquisition phase. This is accomplished by purchasing the Airbus A330 MRTT or the KC-46. Purchasing an already designed aircraft has some inherent benefits when it comes to financial savings, making it easy to advocate among politicians. There is also a less obvious benefit related to recruitment during the current pilot retention crisis being experienced in the RCAF.

9. The primary financial benefit is design and production time has already been absorbed by the first purchasers. The USAF spent 7.4 billion USD, 17 percent of the KC-46 budget, on research, development, test and evaluation.¹² The CAF would be liable for the costs of procurement and contracting. Additional benefit includes already established procedures that are published in the NATO Allied Tactical Publication 3.3.4.2, which details refuelling procedures for all allied tanker aircraft. The most significant benefit in training allows the RCAF to send aircrew members and maintainers to begin training with partner nations on the tanker well before the RCAF receives their first aircraft. The training would ease the transition with the new tanker and expedite its operational employment.

¹⁰ Allen Cone, “GAO: Air Force Shifting Money to KC-135 Because of KC-46 Tanker Problems,” *United Press International*, last modified 14 June 2019, <https://www.upi.com/Defense-News/2019/06/14/GAO-Air-Force-shifting-money-to-KC-135-because-of-KC-46-tanker-problems/6511560523281/>.

¹¹ Hansen, “What’s Happening to . . .”.

¹² Department of Defense, DD-A&T(Q&A)823-387, *Selected Acquisition Report: KC-46A Tanker Modernization*, (Arlington: DoD, 2018), 25.

10. The final and less obvious benefit is that the A330 and the KC-46 are variants of commercial aircraft currently in use by major airlines. This aids in recruiting younger pilots with their sights on commercial aviation as a post-military career. The similar aircraft also provides an avenue to recruit commercial pilots to serve in the CAF simultaneously or intermittently with their civilian flying career. With stricter airline hiring regulations, this will give existing RCAF pilots an incentive to remain in the service building hours and proficiency.

11. The primary negative aspect to selecting an existing platform relates to technology. Improved technology and displays may require modifications to the original instrument panel design. While the modification may not be as expensive as a completely new aircraft design, it may drive initial costs higher. Additionally, if the RCAF is searching for alternative fuels for environment preservation, modification of an existing aircraft may be costlier than a new design. As a final negative to procuring an A330 or KC-46 is both airframes' ability to carry passengers and pallets. The countries that currently employ these aircraft have a larger variety of tactical and strategic cargo transport aircraft. In comparison to Canada's five Boeing C-17s and 23 C-130Js, the Royal Air Force has 36 Airbus A400s and C-130Js to complement their eight C-17s.¹³ The French Air Force has 37 tactical airlift variants and 12 strategic airlifters.¹⁴ The limited cargo capability of the existing tankers would not improve the existing airlift capabilities of the RCAF.

Purchase or Lease Used Tankers

12. The final solution is to take advantage of the divestment that the USAF is executing with their KC-10 Extender. The USAF intends to reduce their inventory of KC-10s from 59 down to 48 by 2020.¹⁵ During a United States congressional hearing in 2014, the USAF assistant deputy chief of staff of operations, Major General James Jones, indicated that the plan for divestment of the KC-10 would be at a one-for-one rate as the KC-46 was delivered to the USAF.¹⁶ Recently announced in 2019, the expected delivery rate for the KC-46 is three per month.¹⁷ This would allow the RCAF to easily project the acquisition of KC-10s.

13. Purchasing or leasing the KC-10 from the USAF would provide similar benefits as purchasing the A330 or KC-46. As a long existing AR platform, the KC-10 transition

¹³ "Royal Air Force (Britain) Aircraft Inventory (2019)," *The World Directory of Modern Military Aircraft*, last accessed October 18, 2019, <https://www.wdmma.org/royal-air-force-britain.php#transports>.

¹⁴ "French Air Force Aircraft Inventory (2019)," *The World Directory of Modern Military Aircraft*, last accessed October 18, 2019, <https://www.wdmma.org/french-air-force.php#transports>.

¹⁵ Rachel Cohen, "Barrett Points to Tanker Retirement, Launch Expansion in Response to Lawmakers," *Air Force Magazine*, last modified 12 September 2019, [http://airforcemag.com/Features/Pages/2019/September 2019/Barrett-Points-to-Tanker-Retirement-Launch-Expansion-in-Response-to-Lawmakers.aspx](http://airforcemag.com/Features/Pages/2019/September%202019/Barrett-Points-to-Tanker-Retirement-Launch-Expansion-in-Response-to-Lawmakers.aspx).

¹⁶ House of Representatives, *Hearing Before the Subcommittee on Seapower and Projection Forces*, (2 April 2014).

¹⁷ Cohen, "Barrett Points to . . .".

would also be simpler than a new design and would serve immediate compatibility with NATO aircraft. The RCAF would have to add boom operator as a career field which would be an attractive recruiting opportunity while also giving the RCAF the option to refuel USAF aircraft incapable of probe-and-drogue refuelling. This added capability enhances the RCAF's NORAD mission support. The KC-10 also exceeds the pallet capacity of both the KC-46 and the A330, easily augmenting the airlift mission with its 23 pallet positions. The decision to lease rather than buy would be based on the RCAF's outlook on its commitment to using the KC-10 in the long-term, and leasing would give the benefit of the KC-10 serving as an interim tanker to augment its existing CC150 until a more modern replacement is acquired.

14. Though the KC-10 production line ceases to exist, unlike the KC-135 Stratotanker, cargo operators like FedEx still operate the similar MD-10. FedEx intends to retire the MD-10 as they procure Boeing 767s. FedEx indicates in their recent stat book that the company will fully retire the MD-10 by 2022, with 31 aircraft planned for retirement over the next three years.¹⁸ Even though the MD-10 is not an AR aircraft, it still provides an avenue for acquiring parts from a reputable company. In limiting training costs, the RCAF would also be able to negotiate the acquisition of KC-10 simulators that FedEx will eventually no longer require by 2022.

15. The most significant negative aspects of procuring the KC-10 is related to long-term costs and environmental concerns. There will be initial savings in procuring the KC-10 compared to purchasing a new aircraft. However, the fuel consumption of the KC-10's wide body airframe and its older less efficient engines will prove costlier in the long-term. The USAF Pamphlet (AFPAM) 10-1403 lists the KC-10 fuel burn rate as 18,948 pounds per hour compared to 11,000 pounds per hour of the KC-46.¹⁹ The RCAF can expect to spend one third more on fuel with this solution than it would on the first two proposed solutions. The consumption of fuel would also have an impact on the environment that would make the KC-10 option less than desirable. Though there are numerous operational and short-term financial benefits to this option, it would be difficult for those operational impacts to outweigh the negative environmental impacts.

¹⁸ Federal Express Corporation, *Q1 Fiscal 2020 Statistics*, (Memphis: FedEx Corp. Investor Relations 2019), 17.

¹⁹ United States Air Force, *Air Force Pamphlet 10-1403 Air Mobility Planning Factors*, (Washington D.C.: AMC/A3X, 2011), 17.

CONCLUSION

16. The decision to replace the aging CC-150 MRTT is inevitable and delaying the procurement of a replacement places stress on the aircraft and the personnel while also failing to meet the RCAF's recapitalization efforts. This service paper has provided three distinct solutions for the RCAF leadership to consider when balancing the need for a replacement tanker with the financial constraints of the Canadian defense budget. The most significant multi-role benefits have been identified in each of the solutions, and the most significant disadvantages to Canadian fiscal concerns have been disclosed to help leadership expedite a replacement. While the USAF has proven that it can keep its aging fleet of tankers flying for close to half a century, it should not be a model the RCAF emulates.

RECOMMENDATION

17. The best course of action for the RCAF is to select the second solution of purchasing an A330, KC-46 or another jet propelled tanker that has already stood the rigors of development and testing and is being employed operationally. While the KC-10 solution does have many advantages, its inefficiencies do not match the culture that this foreign officer believes integrates with Canada's vision of the future. The A330 and KC-46 are equipped with efficient engines, have modern equipment, and are both capable of fully supporting the SSE defense policy in the air mobility roles of AR and airlift. Either of these tankers will ensure the RCAF continues to support domestic and international engagements for decades to come, and concurrently renew the romance of flight in its current and future operators.

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